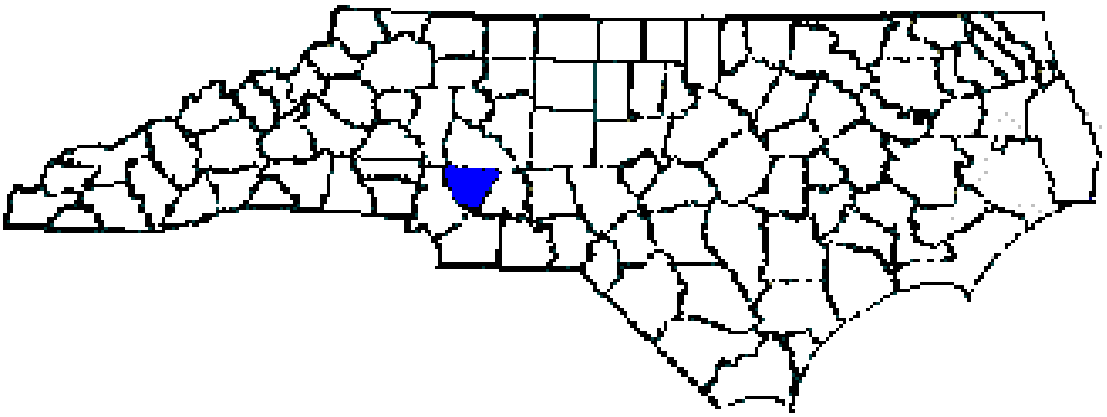
ANNUAL REPORT FOR 2010



UT to Irish Buffalo Creek Mitigation Site
Cabarrus County
TIP No. R-2533B (Site 12)

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North Carolina Department of Transportation
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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2010 at the UT to Irish Buffalo Creek Stream Mitigation Site (permitted Site #12) in Cabarrus County. The North Carolina Department of Transportation (NCDOT) completed construction in March 2005. This report provides the monitoring results for the third formal year of monitoring (Year 2010). The Year 2010 monitoring period is the third of five scheduled years of monitoring on the UT to Irish Buffalo Creek Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at permitted Site #12 for UT to Irish Buffalo Creek, it has met the required monitoring protocols for the third formal year of monitoring. The channel throughout the relocated stream is stable at this time. The streambank and buffer areas have planted vegetation surviving for the third year of monitoring. The North Carolina Department of Transportation will continue stream monitoring at the UT to Irish Buffalo Creek Mitigation Site for 2011.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2010 at the UT to Irish Buffalo Creek Stream Mitigation Site. Site # 12 is located on NC 49 in Cabarrus County at Sta. 11+040 to Sta. 11+230 –L1- RT. (Figure 1). The UT to Irish Buffalo Creek Site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2533B in Cabarrus County.

The mitigation site provided approximately 563 linear feet of stream restoration. Construction was completed during March 2005 by the North Carolina Department of Transportation (NCDOT). Stream restoration involved the installation of cross vanes, coir fiber matting and live stakes along the streambank, and bareroot seedlings in the buffer area.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2010 at the UT to Irish Buffalo Creek Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

March 2005	Construction Completed
March 2008	Replanted Site
September 2008	Stream Channel Monitoring (1 year)
October 2009	Stream Channel Monitoring (2 year)
October 2010	Stream Channel Monitoring (3 year)

1.4 Debit Ledger

The entire UT to Irish Buffalo Creek (Site #12) stream mitigation site was used for the R-2533B project to compensate for unavoidable stream impacts.

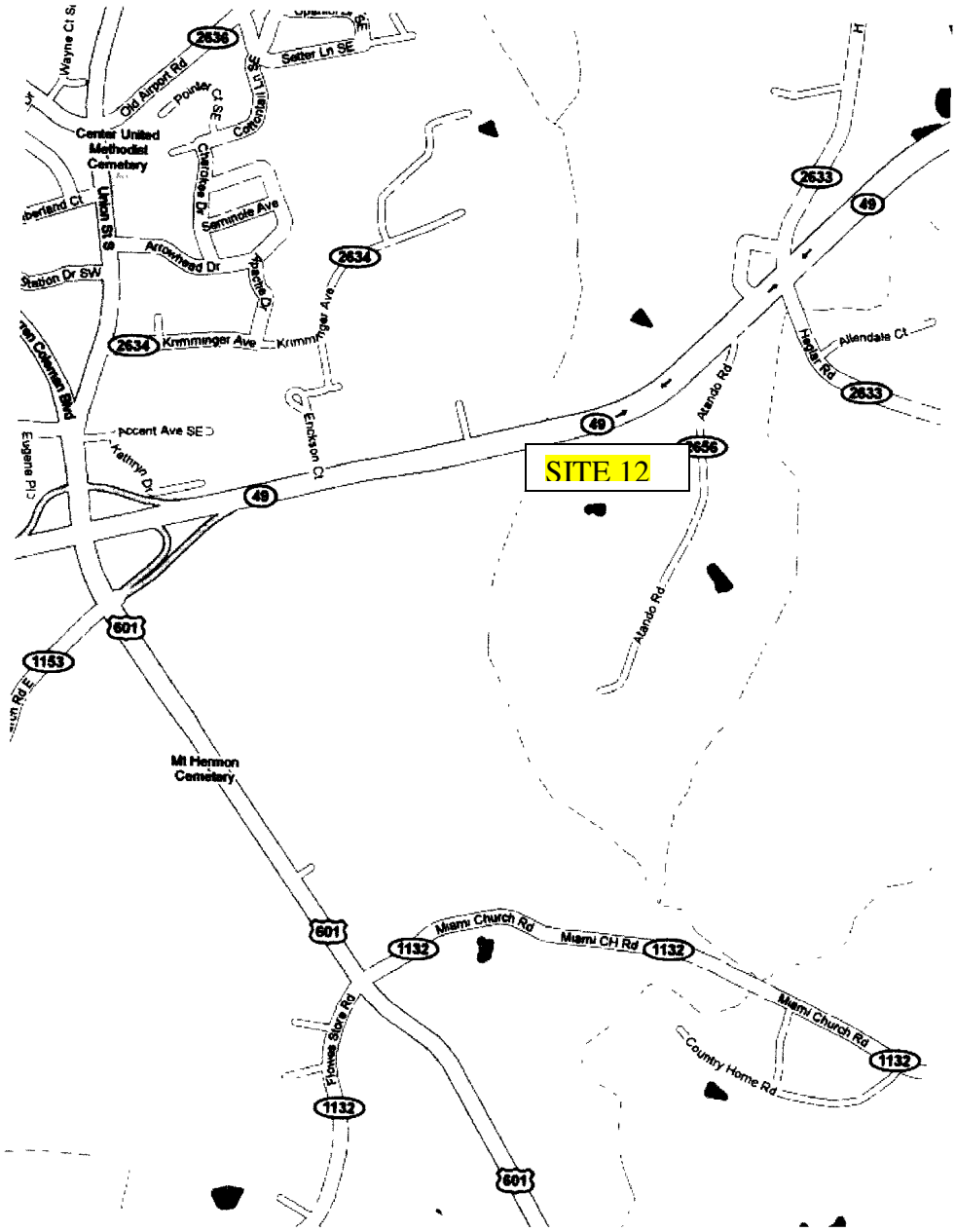


Figure 1. Site Location Map

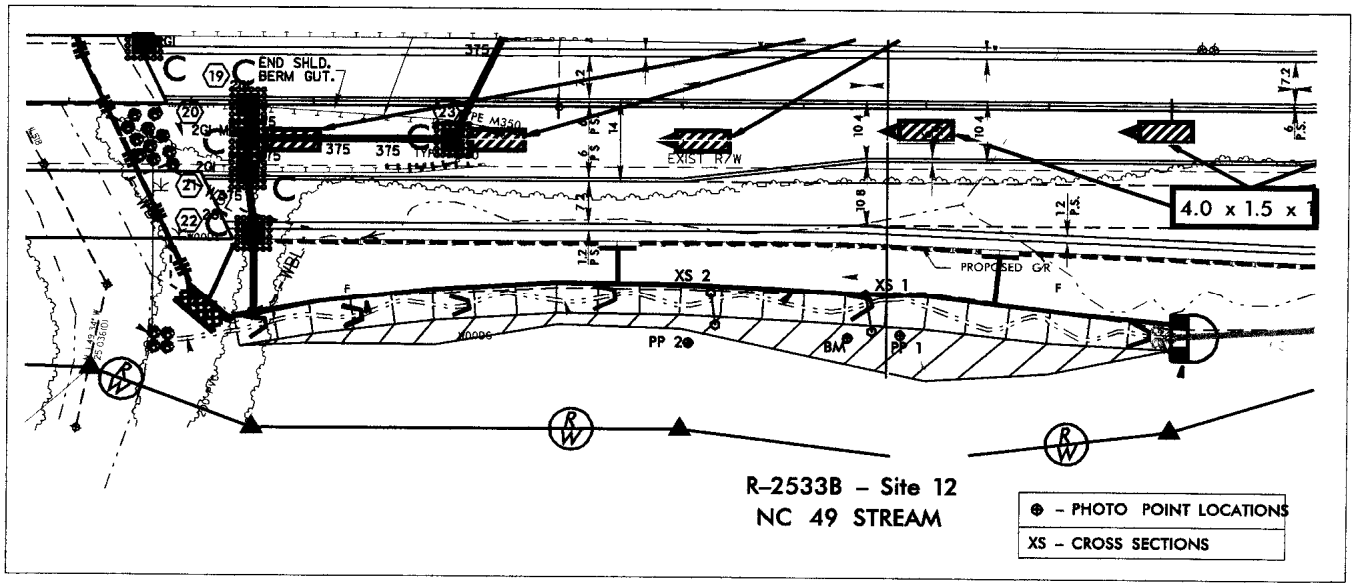


Figure 2. Site #12 Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The following surveys were conducted in support of the monitoring assessment and in accordance with the regulatory permits obtained for this project:

Stream Geomorphological Assessment

- The stream shall be monitored for a duration of five years from the end of construction (channel modifications and vegetation planted)
- The data shall be collected and submitted to the US Army Corps of Engineers and N.C. Division of Water Quality no later than January 1st each year for five years after construction
- At Site #12, 563 linear feet of stream channel will be relocated. A permanent cross section shall be established in a meander and at an inflection point along the channel.
- In order to evaluate the stability of the new channel, the channel cross section at each permanent station identified above shall be measured on a yearly basis for five years and width:depth ratio compared to the as-built cross section

2.2 Stream Description

2.2.1 Post-Construction Conditions

The restoration of UT to Irish Buffalo Creek Site #12 involved installation of cross vanes, coir fiber matting and live stakes along the streambank, and bareroot seedlings in the buffer area.

2.2.2 Monitoring Conditions

The objective of the UT to Irish Buffalo Creek Site #12 stream restoration was to build an E4b stream as identified in Rosgen's Applied River Morphology. A total of two cross sections (one in a riffle and one in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site #12).

Table 1. Abbreviated Morphological Summary (UT Irish Buffalo Site #12)

Variable	Proposed	2008	2009	2010	2011	2012
		Riffle Cross-Section #1	Riffle Cross-Section #1	Riffle Cross-Section #1		
Drainage Area (mi^2)	0.1	0.1	0.1	0.1		
Bankfull Width (ft)	5.4	5.6	6	6		
Bankfull Mean Depth (ft)	1.2	0.5	0.5	0.5		
Width/Depth Ratio	4.5	11.1	12	12		
Bankfull Cross Sectional Area (ft^2)	5.0	2.8	3	3		
Maximum Bankfull Depth (ft)	1.5	1.09	1.1	1.1		
Width of Floodprone Area (ft)	18.0	17.1	17.1	17.1		
Entrenchment Ratio	3.3	3.1	2.9	2.9		

* Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of two cross sections at Site #12. Longitudinal profile monitoring was not required per the permit conditions and therefore was not completed. All of the cross sections were established during the 2008 monitoring year. Cross section locations were determined based on choosing segments that were representative of the entire reach. The cross sections are shown in Appendix A.

Site #12 Cross-Sections:

- Cross-Section #1: UT Irish Buffalo Creek Site #12, midpoint of riffle
- Cross-Section #2: UT Irish Buffalo Creek Site #12, midpoint of pool

Based on comparisons of all three years of monitoring data, all of the cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance. A bankfull event had recently occurred onsite. Pebble counts were not required per the permit conditions and therefore were not completed.

3.0 VEGETATION: UT to IRISH BUFFALO CREEK

3.1 Description of Species

The following tree species were planted on the stream bank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

Alnus serrulata, Tag Alder

The following tree species were planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Quercus nigra, Water Oak

Faxinus pennsylvanica, Green Ash

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: The stream was vegetated throughout with black willow, silky dogwood, tulip poplar, sycamore, green ash, water oak, winged elm, cottonwood, and various herbaceous species. In accordance with the permit conditions, only visual monitoring of the stream and buffer vegetation is required, therefore no vegetation plots were set at this site.

3.3 Conclusions

There was no vegetation monitoring plots established throughout the buffer planting area. After the third year of monitoring, the UT Irish Buffalo Creek Mitigation Site shows by visual observation that the tree species planted in the streambank and buffer areas are surviving. NCDOT recommends continuing the visual vegetation monitoring of this site.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The UT to Irish Buffalo Creek Mitigation Site has met the required monitoring protocols for the third formal year of monitoring. The channel throughout the relocated stream is stable at this time. The streambank and buffer have vegetation surviving for the third formal year of monitoring. NCDOT will continue monitoring the UT to Irish Buffalo Creek Mitigation Site in 2011.

5.0 REFERENCES

North Carolina Department of Transportation (NCDOT), November 19, 2001. Permit for R-2533A and R-2533B (Action ID.199702364).

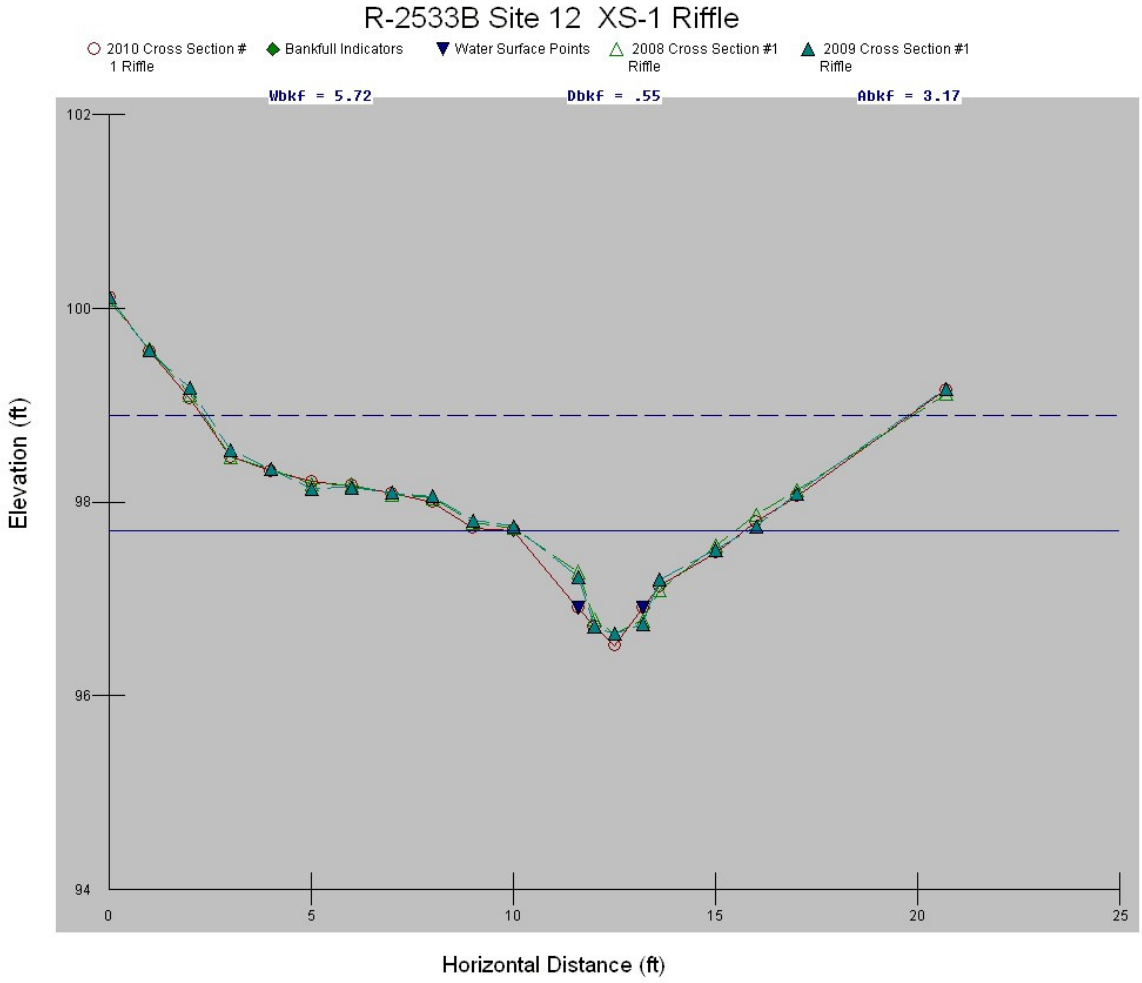
North Carolina Department of Transportation (NCDOT), November 26, 2001. Permit for R-2533A and R-2533B (DWQ Project No. 011274).

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality.

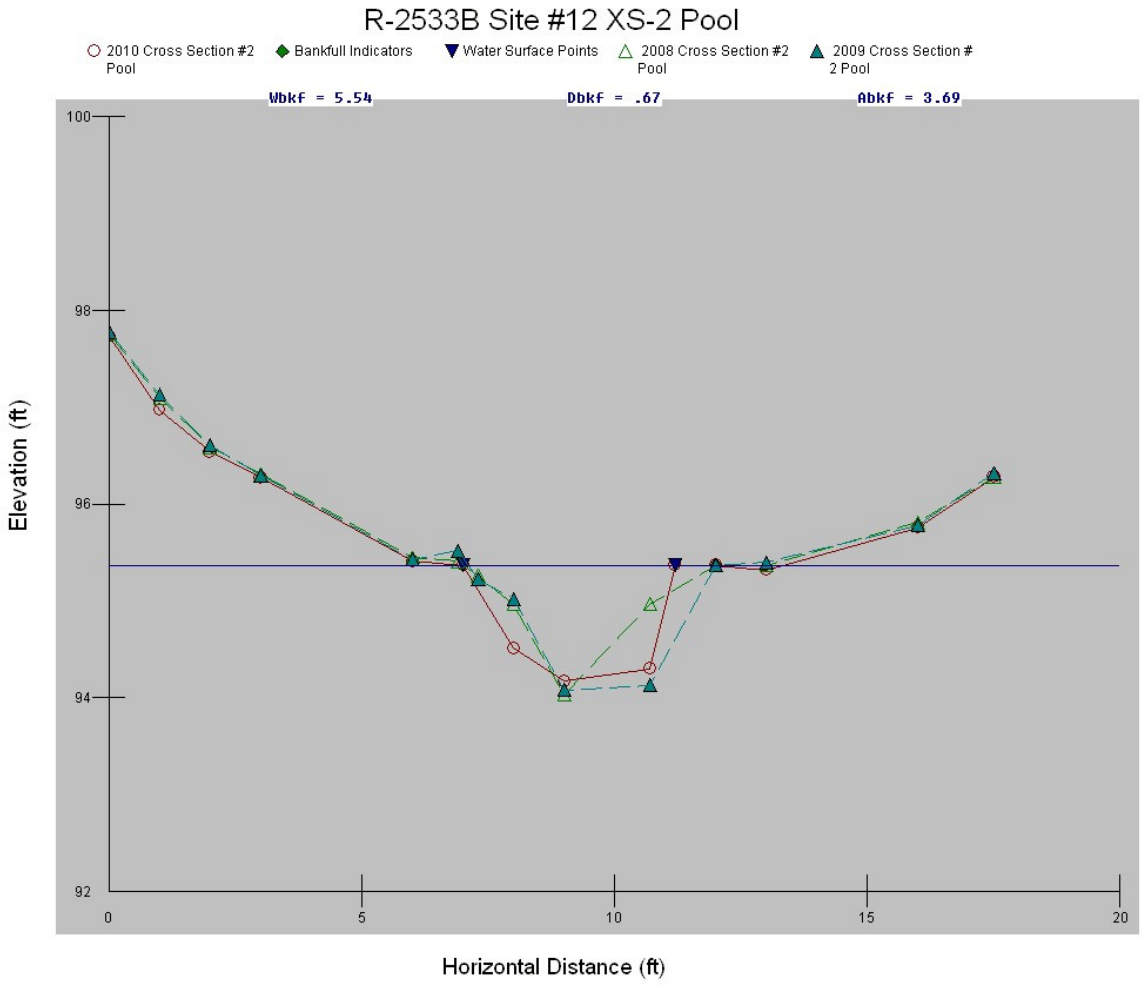
APPENDIX A

CROSS SECTIONS



Site #12: Cross-Section #1 (Riffle) Abbreviated Morphological Summary

	2008	2009	2010	2011	2012
Bankfull Cross Sectional Area (ft^2)	**2.8**	**3**	**3.17**		
Maximum Bankfull Depth (ft)	**1.1**	**1.1**	**1.19**		
Width of the Floodprone Area (ft)	**17.1**	**17.1**	**17.54**		
Bankfull Mean Depth (ft)	**0.5**	**0.5**	**0.55**		
Width/Depth Ratio	**11.1**	**12**	**10.4**		
Entrenchment Ratio	**3.1**	**2.9**	**3.07**		
Bankfull Width (ft)	**5.6**	**6**	**5.72**		



Site #12: Cross-Section #2 (Pool) Abbreviated Morphological Summary*

	2008	2009	2010	2011	2012
Bankfull Cross Sectional Area (ft^2)	**2.8**	**3.9**	**3.69**		
Maximum Bankfull Depth (ft)	**1.3**	**1.3**	**1.2**		
Bankfull Mean Depth (ft)	**0.7**	**0.8**	**0.67**		
Bankfull Width (ft)	**4.9**	**4.9**	**5.54**		

* According to the Rosgen Classification of Natural Rivers floodprone width, entrenchement ratio, and width depth ratio are not measured in pool, glide, or run features.

APPENDIX B

SITE PHOTOGRAPHS

UT Irish Buffalo Creek Site #12

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream)

Photo Point #2 (Downstream)

October 2010